UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/481,351 | 01/12/2000 | DAVID R. PAYNE | 082380-00339 | 5540 |

28839 7590 12/23/2003

MCKINNEY & STRINGER, P.C.
101 N. ROBINSON
OKLAHOMA CITY, OK 73102

| EXAMINER | |
|---|---|
| ADDIE, RAYMOND W | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 3671 | |

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/481,351 | PAYNE ET AL. | |
| | Examiner | Art Unit | |
| | Raymond W. Addie | 3671 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *17 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *25,57-71 and 75-78* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25,57-71 and 75-78* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 75, 76 77, 78 are rejected under 35 U.S.C. 102(e) as being anticipated by Alft # 6,308,787 B1.

Alft discloses a method for using a horizontal drilling machine having a plurality of automated functions, the machine comprising a drill string to which an underground tool is attached. The method comprising:

Selecting a path along which the underground tool is to be used.

Axially advancing the drill string so as to move the underground tool along at least a portion of the selected path, while automatically operating at least one of the plurality of automated functions of the drilling machine.

Automatically controlling power used by the drilling machine, by;

Sensing a speed of an engine, detecting an input to a thrust circuit used to advance the drill string.

Detecting an input to a rotation circuit used to rotate the drill string.

Detecting an input to a fluid dispensing assembly and used to supply fluid during a boring operation.

Setting the engine speed to a desired speed and/or torque dependent upon operational requirements.

Wherein the underground tool can be advanced in a particular direction by automatically rotating and/or thrusting the drill string.

Further, Alft does specifically recite advancing the drill string until the drill string must be lengthened, it is inherent from the disclosure of Alft, that the drill string cannot be further advanced until the rotation motor (19) automatically threads a new drill string member (23) to the up hole end of the drill string (22). See Col. 13, Ins. 5-20; col. 30, col. 40, 43.

In regards to Claims 76-78 Alft discloses automatically controlling the supply of fluid to the underground tool by maintaining fluid flow at a predetermined flow rate when drill string is being advanced, a fluid pressure and a measured flow rate is at or above a predetermined rate, as well as activating and deactivating fluid jets to introduce/change the type/change the viscosity/change the temperature of a cutting fluid, in real time, dependent upon operational requirements. See Col. 10, Ins. 34-61; Col. 12, Ins. 53-col 13, In. 43; col. 18, Ins. 35-col. 19. In. 39.

Alft further discloses the steps of:

Automatically rotating and thrusting the drill string forward or backward, as well as rotating the srill string to a desired roll orientation; until a change of direction is required or the drill string must be lengthened or shortened.

Alft further discloses a method of locating an drill head comprising:

Sensing a roll position of the underground tool.

Sensing a pitch of the underground tool.

Sensing an orientation of the underground tool.

Sensing a temperature of the underground tool.

Calculating the position of the underground tool.

See Figs. 3A-3E; col. 5, lns. 1-30; Col. 16, lns. 15-60.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 25, 57-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alft # 6,308,787 B1.

Alft discloses a horizontal drilling system comprising:

A horizontal drilling machine (12).

A drill string (22).

A drive system (17, 19) operatively connectable to a 1st end of the drill string. Said drive system being adapted to advance the drill string through the earth.

A down hole tool (24) connectable to a 2nd end of the drill string.

A pipe handling assembly adapted to extend and reduce the length of the drill string by automatically adding or subtracting a drill string member (23).

See Cols. 12-13.

A fluid dispensing assembly adapted to deliver fluid, such as mud and water, to the downhole tool (24).

A machine control system (25) adapted to operate the drilling machine.

Said control system comprising:

A plurality of sensors (27, 152, 162, 167, 168, 189, 195, 198). Each sensor adapted to sense data relative to at least one of a plurality of parameters defining the operation or environment of the drilling machine.

A main control circuit (72, 74), see col. 13, lns. 45-58, adapted to receive data from the plurality of sensors and automatically operate the drilling machine in response to the data.

Wherein at least one of the plurality of automated functions is selected from the group comprising a pipe handling function, a power management function, a guidance control function, a fluid control function and a tracking function.

See col. 12, ln. 53-Col. 13, ln. 20; Col. 15, lns. 25-39; Col. 16, lns 45-53

A rotation circuit input sensor adapted to monitor input to the drive system and transmit a rotation input signal. See col. 16, lns. 45-53.

A fluid circuit input sensor adapted to monitor input to the fluid dispensing assembly and transmit a fluid input signal. See col. 18, lns. 48-50.

Wherein, when the plurality of automated functions comprises the guidance control function; the plurality of sensors comprises a thrust output sensor adapted to monitor thrust applied to the drill string and transmit a thrust output signal. A rotation circuit sensor adapted to monitor rotation applied to the drill string and transmit a rotation output signal. A carriage position sensor adapted to monitor a relative position of a (thrust/pullback) carriage (19). and transmit a carriage position signal.

Wherein, when the plurality of automated functions comprises the fluid control function, the plurality of sensors comprises an operating sensor adapted to transmit an operating signal when the fluid dispensing system is required to be operational.

A flow rate sensor adapted to monitor the rate of flow from the fluid dispensing system and transmit a flow rate signal. A fluid pressure sensor adapted to monitor the output of the fluid dispensing system and transmit a fluid pressure signal and a flow sensor adapted to detect presence of fluid flow and transmit a fluid flow signal.

Wherein, when the plurality of automated functions comprises the tracking function; the plurality of sensors comprises roll, pitch and azimuth sensors, each adapted to detect

and transmit a roll, pitch and azimuth orientation signal respectively, of the downhole tool (24). A temperature sensor adapted to detect a temperature at the downhole tool and transmit a temperature signal.

Although Alft does not specifically recite individual sensors for each automated function, Alft clearly discloses each automated function is performed in "real-time" and transmits data regarding each of the automated functions to a central processor (25); in order to permit "real time" safety oriented control, to change a particular boring machine or boring tool operation given the dynamics of a given applications.

See Col. 16, lns. 45-61. See also Col. 3, lines 5-20, Col. 12, lines 24-col. 13, line 43; col. 14, lines 48-60, col. 15, lines 5-25, col. 18, lines 35-col. 19, line 55, col. 27, lines 16-43, Cols. 37-42 in their entirety.

In regards to Claims 57-59 Alft discloses the drive system further comprises a thrust circuit adapted to thrust the drill string and a rotation circuit adapted to rotate the drill string. Wherein, when the plurality of automated functions comprises a power management function, the plurality of sensors comprises an engine (169) speed monitor (72) adapted to detect an operating speed of an engine/motor/pump and transmit and an engine output signal (Cs). See col. 18, lns. 45-48; Col. 40, emphasis in lns 59-67.

A thrust circuit input sensor adapted to monitor input to the drive system and transmit a thrust input signal such that the main control circuit (74, 72) is further adapted to control engine performance and operation at all operating speeds, based on signals from various geophysical and machine operating sensors to include engine control signals (Cs) from the central processor (72). See col. 40, 43.

In regards to Claim 60 Alft discloses when the plurality of automated functions comprises the power management function, the plurality of sensors further comprises:

A thrust circuit output sensor adapted to monitor an output of the thrust circuit and transmit a thrust output signal.

A rotation circuit output sensor adapted to monitor an output of the rotation circuit and transmit a rotation output signal.

A fluid circuit output sensor adapted to monitor an output of the fluid dispensing assembly and transmit a fluid output signal.

Wherein, the main control circuit is adapted to regulate output of the engine in response to the engine output signal, the thrust input signal, the rotation input signal, the fluid input signal, the thrust output signal, the rotation output signal and the fluid output signal to automatically operate the power management function. See Cols. 39-40.

In regards to Claims 63, 64, 71 Alft discloses the main control circuit (74) is further adapted to automatically operate the guidance function and a tracking function when the downhole tool is to be advanced in a particular direction by operating the drive system to rotate and/or thrust, the drill string to a desired orientation (to include roll poition signals, orientation signals, pitch and yaw signals) indicating a change of direction is required or the drill string must be lengthened. See Col. 30, 39-40, col. 42.

In regards to Claim 65 Alft discloses when the plurality of automated functions comprises the guidance function, the plurality of sensors further comprises:

A rotation circuit speed sensor, adapted to monitor to monitor a rotational speed of the drill string and transmit a rotational speed signal.

A product tension sensor adapted to detect a tension/stress/pressure at the downhole tool and transmit a product tension signal.

Wherein the main control circuit is adapted to operate the drive system in response to the thrust output signal, the rotation output signal, the carriage position signal, the rotational speed signal and the product tension signal to automatically operate the guidance control function. See Col. 40, 43.

In regards to Claim 66, Alft discloses the main control circuit is further adapted to automatically operate the guidance function when the downhole tool is used in a backreaming operation, by operating the drive system to rotate and pullback the drill

string until the drill string must be shortened by unthreading a drill string member (230 from the drill string. See col. 30, lns. 19-37.

In regards to Claims 67, 68 Alft discloses the main control circuit (74) is further adapted to control a rate of pullback in response to a variety of sensor signals, such as generated by sensors (152, 162). See col. 40. lns. 16-27; col. 43.

In regards to Claims 69 Alft disclsoes the main control circuit is further adapted to automatically operate the fluid control function by operating the fluid dispensing assembly to stop or maintain fluid flow at a predetermined flow rate when operating sensors indicate fluid is required, a fluid pressure is at a predetermined limit and/or a flow rate is above a predetermined rate.
It should be noted that Alft further discloses controlling the viscosity and composition of the fluid based on sensor signals representing a variety of geophysical and machine operating characteristics. See col. 5, lns. 3-31.

***Response to Amendment***

3. The amendment filed 10/17/2003 has overcome all Objections and 112 1st paragraph rejections of the Last Office Action.

***Response to Arguments***

4. Applicant's arguments filed 10/17/2003 have been fully considered but they are not persuasive.

Applicant argues against the reference to Alft by stating "Nowhere, however, does Alft describe or suggest fluid flow that is automatically controlled by stopping the fluid flow if the drill string is being lengthened or shortened. Furthermore, Alft does not suggest or disclose automatically controlling supply of fluid to the underground tool based on whether fluid pressure is at a predetermined limit, as required by amended claim 77".

However, Alft clearly discloses controlling the fluid supply based upon fluid volume, pressure and temperature required to perform various drilling operations, given specific operational information, such as geophysical information, rotation torque, pullback or thrust force; see cols. 5, 10-11. Hence, although not explicitly cited, it would be inherent that Alft contemplates stopping the supply of fluid, when the drill string is being lengthened or shortened, via said control processor/actuatable fluid jets and to optimize the fluid parameters (pressure, viscosity and temperature), when the drill string is operational, based on the drill string pullback/thrust force/or lack thereof.

In regards to Claim 78 the Applicant argues "Alft does not disclose or suggest calculating the position of the tool based on roll, pitch, orientation, and temperature data as is required by amended claim 78".

However, Alft clearly discloses in Col. 18, lns. 34-col. 19, ln. 39 that the position of the underground tool (24) is calculated based on information that "typically includes the pitch, yaw(orientation) and roll of the boring tool" as well as "data concerning the boring tool 24, in real time, such as boring tool temperature and stress/pressure, for example".

Therefore, the argument is not persuasive and the rejection is upheld.

Applicant argues against the 103(a) rejection of Claims 25, 57-71 by stating "Alft does not disclose that when the guidance control function of the machine is automatically operated, a thrust circuit output sensor, a rotation circuit output sensor, and a carriage position sensor are part of the system...nor does Alft suggest that the sensors are needed to monitor the thrust...rotation...or position".

However, Alft clearly discloses in cols. 12-13, a thrust/pullback pump (16), a rotation motor (19), and the ability to automatically thread or unthread a drill string member (23) utilizing said rotation motor (19). Alft further discloses the importance of real-time monitoring of boring machine operations, such as displacement rate, rotation rate and heading; see col. 16, as well as providing up-hole sensor data relating to drill rod displacement data, for example. See col. 17, lns. 17-54.

In summary, Alft discloses in col. 20, "A machine controller (74) coordinates the operation of various pumps, motors, and other mechanisms associated with rotating and displacing the boring tool (81) during a boring operation...The central processor (72) typically has access to a number of automated drill mode routines (71)...which may be executed as needed or desired". Hence, since Alft clearly discloses monitoring the necessary up-hole and down-hole sensor data, to perform the functions claimed, the rejection is upheld.

Applicant argues against the rejection of Claims 57-71 by stating "claims 57-71 depend from claim 25, and further include limitations with respect to Applicant's invention, these claims are also allowable over Alft".
However, although Alft may not positively recite each and every form of sensor claimed, Alft does positively recite monitoring up-hole and down-hole sensor data that corresponds to the various sensors claimed. Hence, in order to monitor and use the cited up-hole and down-hole sensor data, a specific sensor must be contemplated in order to provide the necessary sensor data. See col. 17

***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Addie whose telephone number is (703) 305-0135. The examiner can normally be reached on Monday-Friday from 7:00 am to 2:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas B. Will, can be reached on (703) 308-3870. The fax phone number for this Group is (703) 872-9326.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1113.

**Thomas B. Will**
**Supervisory Patent Examiner**
**Group 3600**

**RWA**
**12/15/2003**